Claims:

1.   A process for determining a transforming element
for a given transformation function, which transformation
function comprises a transformation matrix and corresponds to
a transformation of a digital signal from the time domain
into the frequency domain or vice versa, wherein:
    - the transformation matrix is decomposed into a
rotation matrix and an auxiliary matrix which, when
multiplied with itself, equals a permutation matrix
multiplied with an integer diagonal matrix;
    - the rotation matrix and the auxiliary matrix are each
decomposed into a plurality of lifting matrices;
    - the transforming element is determined to comprise of
a plurality of lifting stages which correspond to the lifting
matrices.

2.   The process of claim 1, wherein the transformation
function is a DCT-I transformation function, DCT-IV
transformation function, DST-I transformation function, DST-
IV transformation function, DFT-I transformation function,
DFT-IV transformation function, DWT-I transformation function
or DWT-IV transformation function.

3.   The process of claim 1 or 2, wherein the lifting
matrices are each block-triangular matrices with two
invertible integer matrices in one diagonal.

4.   The process of claim 3, wherein the invertible integer
matrices in each lifting matrix are identity matrices or
negative identity matrices.

5.   The process of any one of claims 1 to 4, wherein the transforming element comprises five lifting stages.

6.   The process of any one of claims 1 to 5, wherein an audio signal or a video signal is used as the digital signal.

7.   A device for determining a transforming element for a given transformation function, which transformation function comprises a transformation matrix and corresponds to a transformation of a digital signal from the time domain into the frequency domain or vice versa, the device comprising:
      - a first decomposition unit for decomposing the transformation matrix into a rotation matrix and an auxiliary matrix which, when multiplied with itself, equals a permutation matrix multiplied with an integer diagonal matrix;
      - a second decomposition unit for decomposing the rotation matrix and the auxiliary matrix each into a plurality of lifting matrices;
      - a determination unit for determining the transforming element to comprise of a plurality of lifting stages which correspond to the lifting matrices.

8.   A method for transforming a digital signal from the time domain into the frequency domain or vice versa using a transforming element, wherein:
      - the transforming element corresponds to a given transformation function, which transformation function comprises a transformation matrix wherein the transforming element is determined by a process comprising
            - decomposing the transformation matrix into a rotation matrix and an auxiliary matrix which, when

48

multiplied with itself, equals a permutation matrix
multiplied with an integer diagonal matrix;

     - decomposing the rotation matrix and the auxiliary
matrix each into a plurality of lifting matrices;

5   - determining the transforming element to comprise
of a plurality of lifting stages which correspond to the
lifting matrices;

     - each lifting stage comprises the processing of sub-
blocks of the digital signal by an auxiliary transformation
10 and by a rounding unit.

9.   A device for transforming a digital signal from the time
domain into the frequency domain or vice versa comprising a
transformation unit for transforming the digital signal by a
15 transforming element, wherein:

     - the transforming element corresponds to a given
transformation function, which transformation function
comprises a transformation matrix wherein the transforming
element is determined by a process comprising

20   - decomposing the transformation matrix into a
rotation matrix and an auxiliary matrix which, when
multiplied with itself, equals a permutation matrix
multiplied with an integer diagonal matrix;

           - decomposing the rotation matrix and the auxiliary
25 matrix each into a plurality of lifting matrices;

           - determining the transforming element to comprise
of a plurality of lifting stages which correspond to the
lifting matrices;

     - for each lifting stage the device comprises an auxiliary
30 transformation unit for processing sub-blocks of the digital
signal and a rounding unit for processing sub-blocks of the
digital signal.

10.   A computer readable medium having a program recorded thereon, wherein the program is adapted to make a computer perform a process for determining a transforming element for a given transformation function, which transformation function comprises a transformation matrix and corresponds to a transformation of a digital signal from the time domain into the frequency domain or vice versa, wherein:

- the transformation matrix is decomposed into a rotation matrix and an auxiliary matrix which, when multiplied with itself, equals a permutation matrix multiplied with an integer diagonal matrix;

- the rotation matrix and the auxiliary matrix are each decomposed into a plurality of lifting matrices;

- the transforming element is determined to comprise of a plurality of lifting stages which correspond to the lifting matrices.

11.   A computer readable medium having a program recorded thereon, wherein the program is adapted to make a computer perform a method for transforming a digital signal from the time domain into the frequency domain or vice versa using a transforming element, wherein:

- the transforming element corresponds to a given transformation function, which transformation function comprises a transformation matrix wherein the transforming element is determined by a process comprising

- decomposing the transformation matrix into a rotation matrix and an auxiliary matrix which, when multiplied with itself, equals a permutation matrix multiplied with an integer diagonal matrix;

- decomposing the rotation matrix and the auxiliary matrix each into a plurality of lifting matrices;

        - determining the transforming element to comprise
of a plurality of lifting stages which correspond to the
lifting matrices;

- each lifting stage comprises the processing of sub-blocks
5 of the digital signal by auxiliary transformations and by a
rounding unit.